IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Original) A read channel, comprising:

an equalizer configured to equalize a digital signal to provide equalized reproduced signals; and

a Viterbi detector capable of receiving the equalized reproduced signals and converting the reproduced signals into a digital output signal indicative of data stored on a recording medium;

wherein the equalizer is implemented using a coefficient learning circuit that adaptively updates coefficients for the equalizer based upon a cosine function.

2. (Original) The read channel of claim 1, wherein the coefficient learning circuit adjusts coefficients using a tap coefficient update equation having a first parameter, k, for modifying a magnitude response.

3. (Previously Presented) The read channel of claim 2, wherein the first parameter, k, is adjusted according to $k=k-g*(f(a_{k+1})+f(a_{k-1}))*e_k$, where k is the cosine equalizer parameter for modifying the magnitude response, g is an update attenuation gain, f( ) is a predetermined cosine function, a_{k+1} represents a bit to be detected at time k+1, a_{k-1} represents a bit to be detected at time k-1, and e_k is an error signal based on a difference between a noisy equalized signal and a desired noiseless signal.

4. (Original) The read channel of claim 2, wherein the coefficient learning circuit adjusts coefficients using a tap coefficient update equation having a second parameter, j, for modifying a phase response.

5. (Previously Presented) The read channel of claim 4, wherein the second parameter, j, is adjusted according to $j=j-g*(f(a_{k+2})+f(a_{k-2}))*e_k$, where j is the cosine equalizer parameter for modifying the phase response, g is an update attenuation gain, f( ) is a predetermined cosine function, a_{k+2} represents a bit to be detected at time k+2, a_{k-2} represents a bit to be detected at time k-2, and e_k is an error signal based on a difference between a noisy equalized signal and a desired noiseless signal.

6. (Original) The read channel of claim 1, wherein the coefficient learning circuit adjusts coefficients using a tap coefficient update equation having a parameter, j, for modifying a phase response.

7. (Currently Amended) The read channel of claim 1, wherein the coefficient learning circuit adjusts coefficients, w_i, according to $w_i=w_i-g*f(a_{k-i})*e_k$, where g is a provided update attenuation gain and [[$f(a_{k-i})$]] f( ) is a predetermined cosine function and [[a_{k+i}]] a_{k-i} represents a bit to be detected at time [[k+I]] k-i.

8. (Original) The read channel of claim 7, wherein $f(a_{k-i})$ is chosen to be $a_{k-i}-a_{k-i-2}$, wherein written bits that are to be detected, a_{k-i} , are convolved with a PR4 response based upon the cosine function.

9. (Original) The read channel of claim 7, wherein $f(a_{k-i})$ is chosen to be $a_{k-i} + a_{k-i-1} - a_{k-i-2} - a_{k-i-3}$, wherein written bits that are to be detected, a_{k-i} , are convolved with the EPR4 response based upon the cosine function.

10. (Original) The read channel of claim 7, wherein $f(a_{k-i})$ is chosen to be $a_{k-i}t_k$, wherein written bits that are to be detected, a_{k-i} , are convolved with t_k based upon the cosine function.

11. (Original) The read channel of claim 7, wherein $f(a_{k-i})$ is chosen to be $a_{k-i}h_k$, wherein written bits that are to be detected, a_{k-i} , are convolved with h_k based upon the cosine function.

12. (Original) A waveform equalizer that equalizes a waveform of a reproduction signal obtained by reproducing marks and non-marks recorded on a recording medium, comprising:

a delay element that delays a propagation of the reproduced signal;

a plurality of multipliers that multiply predetermined coefficients by the reproduction signal and the delayed signal from the delay element;

a coefficient learning circuit that adaptively updates the predetermined coefficients for each of the plurality of multipliers; and

an adder that adds outputs from the plurality of multipliers;

wherein the coefficient learning circuit adaptively updates coefficients for the equalizer based upon a cosine function.

13. (Original) The waveform equalizer of claim 12, wherein the coefficient learning circuit adjusts coefficients using a tap coefficient update equation having a first parameter, k, for modifying a magnitude response.

14. (Previously Presented) The waveform equalizer of claim 13, wherein the first parameter, k, is adjusted according to $k=k-g*(f(a_{k+1})+f(a_{k-1}))*e_k$, where k is the cosine equalizer parameter for modifying the magnitude response, g is an update attenuation gain, f( ) is a predetermined cosine function, a_{k+1} represents a bit to be detected at time k+1, a_{k-1} represents a bit to be detected at time k-1, and e_k is an error signal based on a difference between a noisy equalized signal and a desired noiseless signal.

15. (Original) The waveform equalizer of claim 13, wherein the coefficient learning circuit adjusts coefficients using a tap coefficient update equation having a second parameter, j, for modifying a phase response.

16. (Previously Presented) The waveform equalizer of claim 15, wherein the second parameter, j, is adjusted according to $j=j-g*(f(a_{k+2})+f(a_{k-2}))*e_k$, where j is the cosine equalizer parameter for modifying the phase response, g is an update attenuation gain, f( ) is a predetermined cosine function, a_{k+2} represents a bit to be detected at time k+2, a_{k-2} represents a bit to be detected at time k-2, and e_k is an error signal based on a difference between a noisy equalized signal and a desired noiseless signal.

17. (Original) The waveform equalizer of claim 12, wherein the coefficient learning circuit adjusts coefficients using a tap coefficient update equation having a parameter, j, for modifying a phase response.

18. (Currently Amended) The waveform equalizer of claim 12, wherein the coefficient learning circuit adjusts coefficients, w_i, according to $w_i=w_i-g*f(a_{k-i})*e_k$, where g is a provided update attenuation gain and and [[$f(a_{k-i})$]] $\underline{f(\ )}$ is a predetermined cosine function and [[a_{k+i}]] $\underline{a_{k-i}}$ represents a bit to be detected at time [[k+I]] $\underline{k-i}$.

19. (Original) The waveform equalizer of claim 18, wherein $f(a_{k-i})$ is chosen to be $a_{k-i}-a_{k-i-2}$, wherein written bits that are to be detected, a_{k-i} , are convolved with a PR4 response based upon the cosine function.

20. (Original) The waveform equalizer of claim 18, wherein $f(a_{k-i})$ is chosen to be $a_{k-i} + a_{k-i-1} - a_{k-i-2} - a_{k-i-3}$, wherein written bits that are to be detected, a_{k-i} , are convolved with the EPR4 response based upon the cosine function.

21. (Original) The waveform equalizer of claim 18, wherein $f(a_{k-i})$ is chosen to be $a_{k-i}t_k$, wherein written bits that are to be detected, a_{k-i} , are convolved with t_k based upon the cosine function.

22. (Original) The waveform equalizer of claim 18, wherein $f(a_{k-i})$ is chosen to be $a_{k-i}h_k$, wherein written bits that are to be detected, a_{k-i} , are convolved with h_k based upon the cosine function.

23. (Original) A signal processing system, comprising:

memory for storing data therein; and

a processor, coupled to the memory, for equalizing a digital signal to provide equalized reproduced signals, the processor adaptively updates coefficients for the equalizer based upon a cosine function.

24. (Original) The signal processing system of claim 23, wherein the processor adjusts coefficients using a tap coefficient update equation having a first parameter, k, for modifying a magnitude response.

25. (Previously Presented) The signal processing system of claim 24, wherein the first parameter, k, is adjusted according to $k=k-g*(f(a_{k+1})+f(a_{k-1}))*e_k$, where k is the cosine equalizer parameter for modifying the magnitude response, g is an update attenuation gain, f( ) is a predetermined cosine function, a_{k+1} represents a bit to be detected at time k+1, a_{k-1} represents a bit to be detected at time k-1, and e_k is an error signal based on a difference between a noisy equalized signal and a desired noiseless signal.

26. (Original) The signal processing system of claim 24, wherein the processor adjusts coefficients using a tap coefficient update equation having a second parameter, j, for modifying a phase response.

27. (Previously Presented) The signal processing system of claim 26, wherein the second parameter, j, is adjusted according to $j=j-g^*(f(a_{k+2})+f(a_{k-2}))^*e_k$, where j is the cosine equalizer parameter for modifying the phase response, g is an update attenuation gain, f( ) is a predetermined cosine function, a_{k+2} represents a bit to be detected at time k+2, a_{k-2} represents a bit to be detected at time k-2, and e_k is an error signal based on a difference between a noisy equalized signal and a desired noiseless signal.

28. (Original) The signal processing system of claim 23, wherein the processor adjusts coefficients using a tap coefficient update equation having a parameter, j, for modifying a phase response.

29. (Currently Amended) The signal processing system of claim 23, wherein the coefficient learning circuit adjusts coefficients, w_i, according to $w_i=w_i-g^*f(a_{k-i})^*e_k$, where g is a provided update attenuation gain and and [[$f(a_{k-i})$]] f( ) is a predetermined cosine function and [[a_{k+i}]] a_{k-i} represents a bit to be detected at time [[k+I]] k-i.

30. (Original) The signal processing system of claim 29, wherein $f(a_{k-i})$ is chosen to be a_{k-i}-a_{k-i-2}, wherein written bits that are to be detected, a_{k-i} , are convolved with a PR4 response based upon the cosine function.

31. (Original) The signal processing system of claim 29, wherein $f(a_{k-i})$ is chosen to be $a_{k-i} + a_{k-i-1} - a_{k-i-2} - a_{k-i-3}$, wherein written bits that are to be detected, a_{k-i} , are convolved with the EPR4 response based upon the cosine function.

32. (Original) The signal processing system of claim 29, wherein $f(a_{k-i})$ is chosen to be $a_{k-i}t_k$, wherein written bits that are to be detected, a_{k-i} , are convolved with t_k based upon the cosine function.

33. (Original) The signal processing system of claim 29, wherein $f(a_{k-i})$ is chosen to be $a_{k-i}h_k$, wherein written bits that are to be detected, a_{k-i} , are convolved with h_k based upon the cosine function.

34. (Original) A magnetic storage device, comprising:

a magnetic storage medium for recording data thereon;

a motor for moving the magnetic storage medium;

a head for reading and writing data on the magnetic storage medium;

an actuator for positioning the head relative to the magnetic storage medium; and

a data channel for processing encoded signals on the magnetic storage medium, the data channel comprising an equalizer configured to equalize a digital signal to provide equalized reproduced signals and a Viterbi detector capable of receiving the equalized reproduced signals and converting the reproduced signals into a digital output signal indicative of data stored on a recording medium; wherein the equalizer is implemented using a coefficient learning circuit that adaptively updates coefficients for the equalizer based upon a cosine function.

35. (Original) The magnetic storage device of claim 34, wherein the equalizer adjusts coefficients using a tap coefficient update equation having a first parameter, k, for modifying a magnitude response.

36. (Previously Presented) The magnetic storage device of claim 35, wherein the first parameter, k, is adjusted according to $k=k-g*(f(a_{k+1})+f(a_{k-1}))*e_k$, where k is the cosine equalizer parameter for modifying the magnitude response, g is an update attenuation gain, f( ) is a predetermined cosine function, a_{k+1} represents a bit to be detected at time k+1, a_{k-1} represents a bit to be detected at time k-1, and e_k is an error signal based on a difference between a noisy equalized signal and a desired noiseless signal.

37. (Original) The magnetic storage device of claim 35, wherein the equalizer adjusts coefficients using a tap coefficient update equation having a second parameter, j, for modifying a phase response.

38. (Previously Presented) The magnetic storage device of claim 37, wherein the second parameter, j, is adjusted according to $j=j-g*(f(a_{k+2})+f(a_{k-2}))*e_k$, where j is the cosine equalizer parameter for modifying the phase response, g is an update attenuation gain, f( ) is a predetermined cosine function, a_{k+2} represents a bit to be detected at time k+2, a_{k-2} represents a bit to be detected at time k-2, and e_k is an error signal based on a difference between a noisy equalized signal and a desired noiseless signal.

39. (Original) The magnetic storage device of claim 34, wherein the equalizer adjusts coefficients using a tap coefficient update equation having a parameter, j, for modifying a phase response.

40. (Currently Amended) The magnetic storage device of claim 34, wherein the coefficient learning circuit adjusts coefficients, w_i, according to w_i=w_i-g*f(a_{k-i})*e_k, where g is a provided update attenuation gain and and [[f(a_{k-i})]] f( ) is a predetermined cosine function and [[a_{k+i}]] a_{k-i} represents a bit to be detected at time [[k+I]] k-i.

41. (Original) The magnetic storage device of claim 40, wherein f(a_{k-i}) is chosen to be a_{k-i}-a_{k-i-2}, wherein written bits that are to be detected, a_{k-i} , are convolved with a PR4 response based upon the cosine function.

42. (Original) The magnetic storage device of claim 40, wherein f(a_{k-i}) is chosen to be a_{k-i} + a_{k-i-1} - a_{k-i-2} - a_{k-i-3}, wherein written bits that are to be detected, a_{k-i} , are convolved with the EPR4 response based upon the cosine function.

43. (Original) The magnetic storage device of claim 40, wherein f(a_{k-i}) is chosen to be $a_{k-i}t_k$, wherein written bits that are to be detected, a_{k-i} , are convolved with t_k based upon the cosine function.

44. (Original) The magnetic storage device of claim 40, wherein f(a_{k-i}) is chosen to be $a_{k-i}h_k$, wherein written bits that are to be detected, a_{k-i} , are convolved with h_k based upon the cosine function.

45. (Original) A read channel, comprising:

means for equalizing a digital signal to provide equalized reproduced signals; and

means, coupled to the means for equalizing, for receiving the equalized reproduced signals and converting the reproduced signals into a digital output signal indicative of data stored on a recording medium;

wherein the means for equalizing is implemented using means for adaptively updating coefficients for the means for equalizing based upon a cosine function.

46. (Original) A waveform equalizer that equalizes a waveform of a reproduction signal obtained by reproducing marks and non-marks recorded on a recording medium, comprising:

means for delaying propagation of a reproduced signal;

means for multiplying predetermined coefficients by the reproduced signal and the delayed signal from the means for delaying;

means for adaptively updating the predetermined coefficients for the means for multiplying; and

means for adding outputs from the means for multiplying;

wherein the means for adaptively updating the predetermined coefficients updates the predetermined coefficients based upon a cosine function.